

Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 12



Vanair inc.
860, Marie-Victorin
St-Nicolas, Lévis (Québec)
Canada, G7A 3S9
Tél. : (418) 561-4512
Fax : (418) 836-2291
www.helitowcart.com

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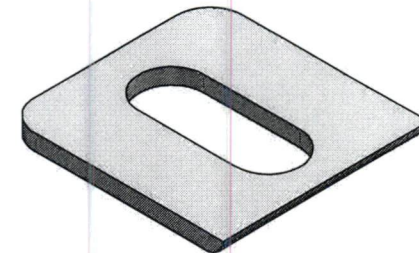
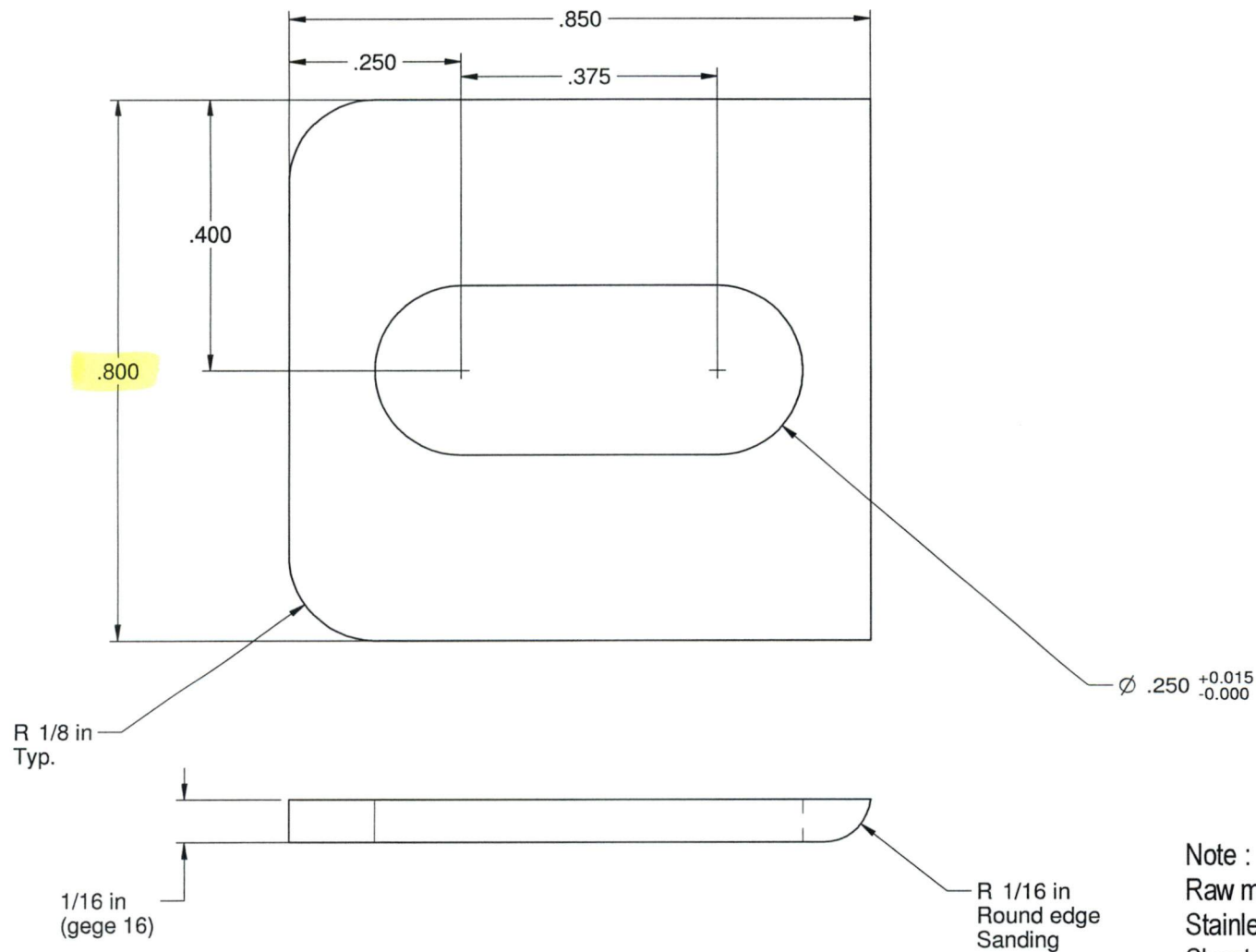
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| Rev. | Description | Date | By |
| R04 | .800 was 0.750 - Gage 12 was 14 | 31-07-06 | G.L. |
| R03 | Issue for production | 04-04-06 | G.L. |

| TOLERANCES | | Titre / Title | | Matériel / Material: | |
|---------------|--|-----------------------------|--------------------|---------------------------------|------------------|
| 1/X ± 1/32" | | Bearpaw - U Shaped clip | | See Note | |
| X.XX ± 0.010" | | Dessiné par / Drawing by: | Date: (yyyy-mm-dd) | Format : | Échelle / Scale: |
| X.XXX ± | | G. Lapointe | 2006-04-24 | A | N/A |
| ANGLE ± 1° | | Vérifié par / Checked by: | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: | Page #: |
| PROJECTION: | | | | VNR087 | 1 de 1 |
| | | Approuvé par / Approved by: | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number: | Rev. #: |
| | | | | 314-0006-15-B | R04 |

31.7.2006
ECO # 1 / DHF

Demande de transport Cau.
lors de revue dem. SEC.

- 14 gauge → 16 gauge.
(1 clip)
- 0.75" → 0.5"
(1 clip + spacer)



Note :
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Sheet gage 16



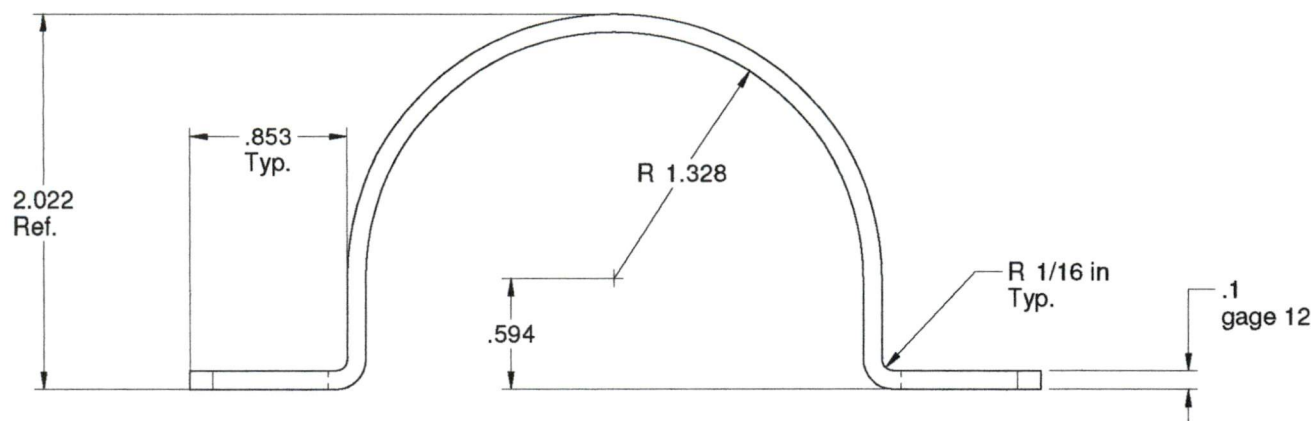
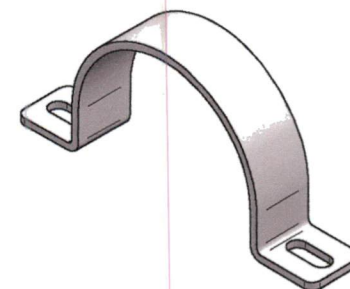
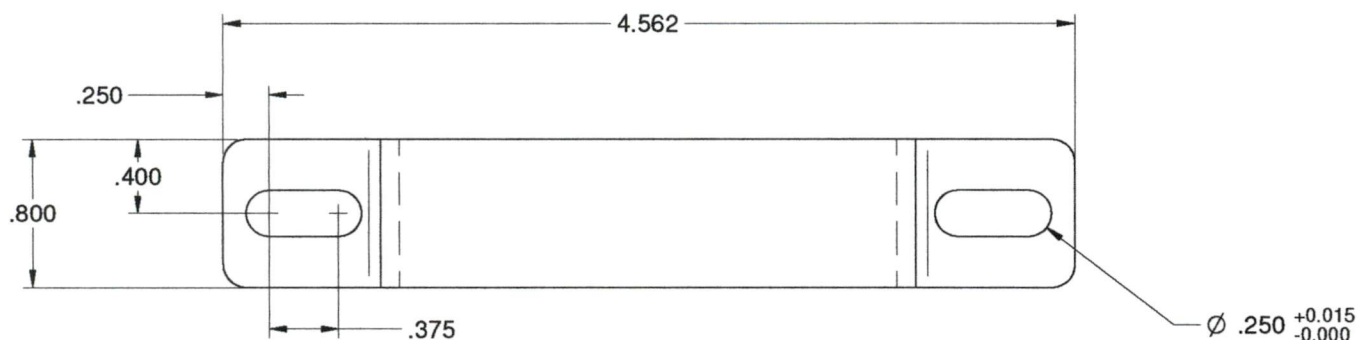
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| ANGLE ± 1° | | Vérifié par / Checked by: | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: | Page #: |
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| | | Approuvé par / Approved by: | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number: | Rev. #: |
| | | | | 314-0007-15-B | R04 |

A: GUILLAUME LARINTE / FX 878-2536



Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 12

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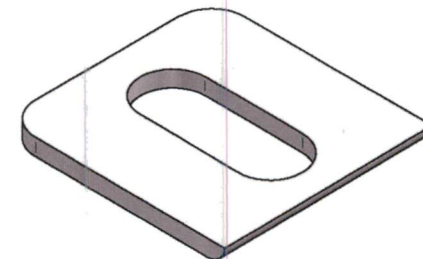
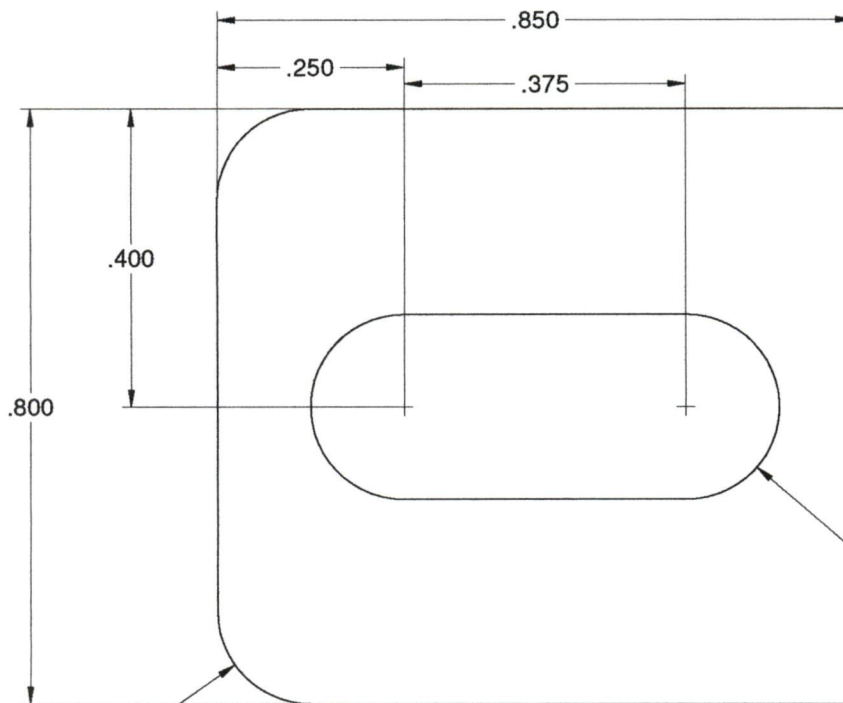
| TOLERANCES |
|---------------|
| 1/X ± 1/32" |
| X.XX ± 0.010" |
| X.XXX ± |
| ANGLE ± 1° |
| PROJECTION: |

| | | | | | |
|---|---|---|--------------------------------|---|--|
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| | | Titre / Title Bearpaw - U Shaped clip | | Matériel / Material: See Note | |
| Dessiné par / Drawing by: G. Lapointe | Date: (yyyy-mm-dd) 2006-04-24 | Format : A | Echelle / Scale: N/A | Page #: 1 de 1 | |
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NATHALIE BARBERA

B 2006.08.03

A: GUILAUME CARBONTE / Fx 878 2534



Ø .250 $+0.015$
 -0.000

R 1/8 in
Typ.

1/16 in
(gege 16)

R 1/16 in
Round edge
Sanding

Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 16

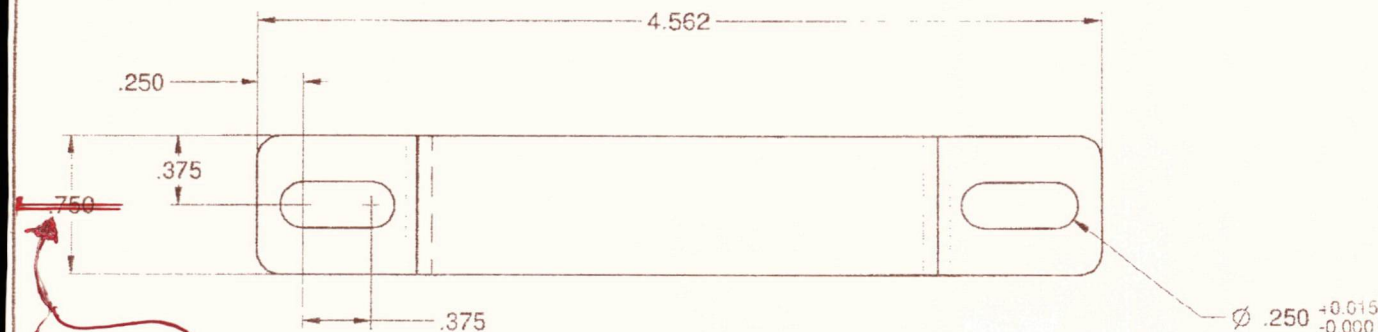
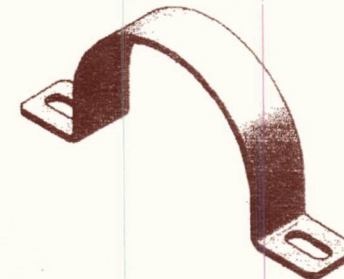
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| X.XX ± 0.010" |
| X.XXX ± |
| ANGLE ± 1° |
| PROJECTION: |

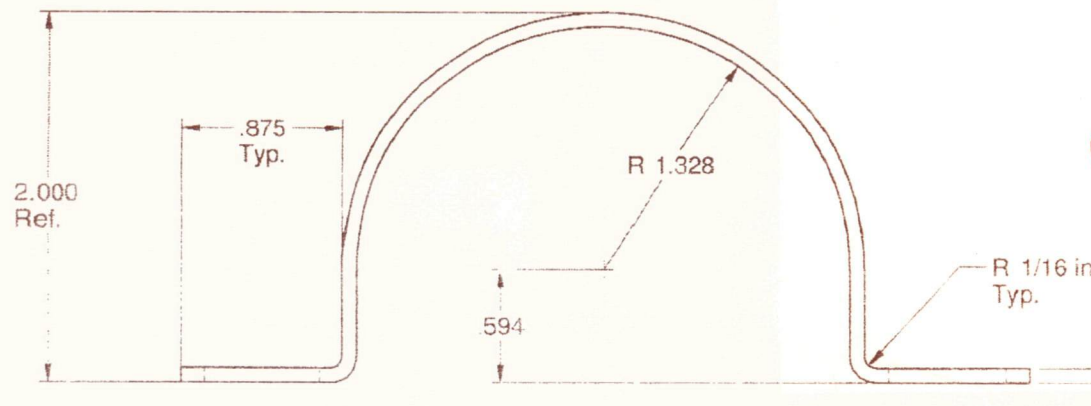
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| Dessiné par / Drawing by: G. Lapointe | | Date: (yyyy-mm-dd) 2006-04-24 | | Format: A | |
| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | | Numéro dessin / Drawing Number: VNR089 | |
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| Matériel / Material: SEE NOTE | | Echelle / Scale: 4 : 1 | | Page #: 1 de 1 | |
| Rev. #: R04 | | Rev. #: R04 | | Rev. #: R04 | |

NATHALIE BARBEAULT

2006-08-03



0.8"



0.1" gauge 12 (?)

0.070 gauge 14

Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 44-12?



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| X.XX ± 0.010" | | Dessiné par / Drawing by: | Date: (yyyy-mm-dd) | Format : | Echelle / Scale |
| X.XXX ± | | G. Lapointe | 2006-04-24 | A | N/A |
| ANGLE ± 1° | | Vérifié par / Checked by: | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: | |
| | | | | VNR087 | |
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| | | | | 314-0006-15-A | |

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| R03 | Issue for production | 04-04-06 | G.L. |

File
19.7-2006
2:50 pm

Page #
1 de 1
Rev# R04
R03

19 JUILLET 2006. Fx: 878.2536
1 PAGE

ATT: GUILLAUME LAPOINTE
DE: NATHALIE BARBEAU, VANAIR

Voici MODIFS REQUISES
TEL QUE MENTIONNÉ
DANS MESSAGE COURRIEL.

Merci
NB.

Date: Wed, 2 Aug 2006 15:40:56 -0400
From: Lucien Barbeau <lbarbeau@sympatico.ca>
To: Helitowcart <info@helitowcart.com>
Subject: Fw: Helitowcart- Demande de modification de version de dessin

----- Original Message -----

From: Nathalie Barbeau
To: 'Guillaume Lapointe'
Cc: lbarbeau@sympatico.ca
Sent: Wednesday, July 19, 2006 2:41 PM
Subject: Helitowcart- Demande de modification de version de dessin

Bonjour Guillaume,

Transport Canada ont fait demande de modification de specs pour le support en U. Cela a déjà été approuvé par notre ingénieur aéronautique et traité. Donc on va devoir s'y adapter.

Donc, il faut:

- 1) élargir le clip de 0.750" à 0.8".
 - 2) épaissir de 0.078" à 0.1" (donc si je comprends de 14 gauge à 12 gauge ?)
- Attention: faudra garder même dimension interne du U.

Svp nous confirmer que le tout est faisable (je m'inquiète pour l'épaisseur.)

Svp appelle Lucien pour lui confirmer que tout est beau. Il va ensuite alors en relancer une nouvelle batch en production.....on a pas le choix!

Je te faxe le dessin avec modifications annotées.

Que dirais-tu de nous le fournir au plus tard pour le 2 août?

Dès qu'il sera prêt, l'envoyer par courriel à Mirko Zgela:
mirko.sgela@sympatico.ca

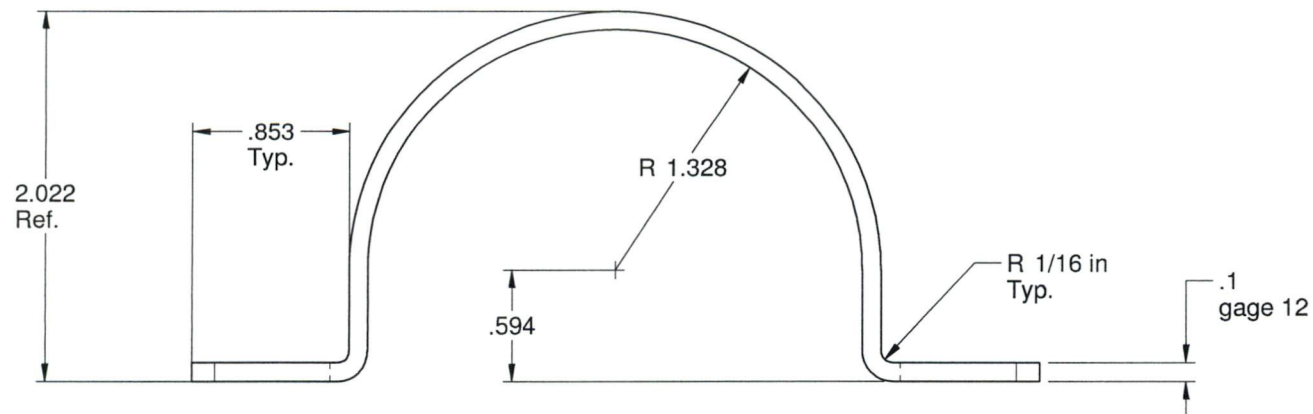
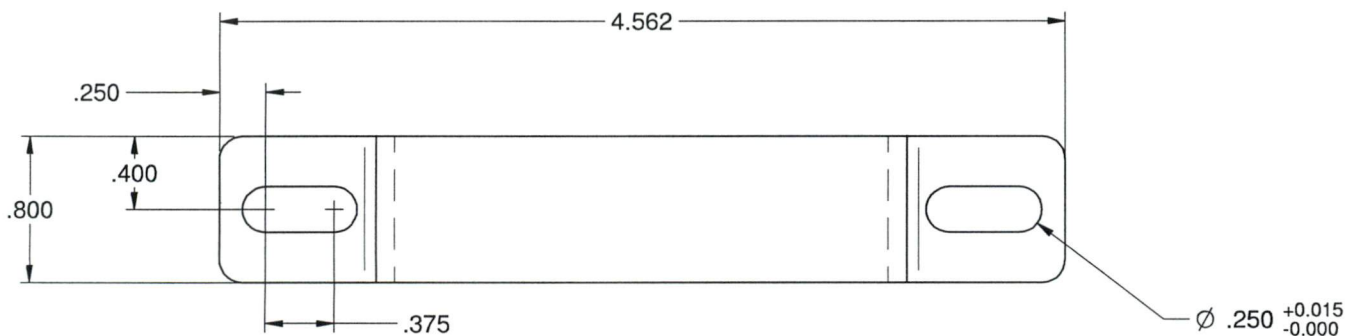
Si questions, contacter Lucien : 563-0217 ou Mirko Zgela au 819-383-4411.

(Je serai en vacances à l'extérieur du 21 juillet au 31 juillet.)

Merci beaucoup Guillaume,

J'espère que tu passes de belles vacances...!

Nathalie



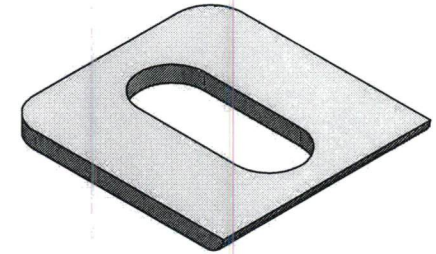
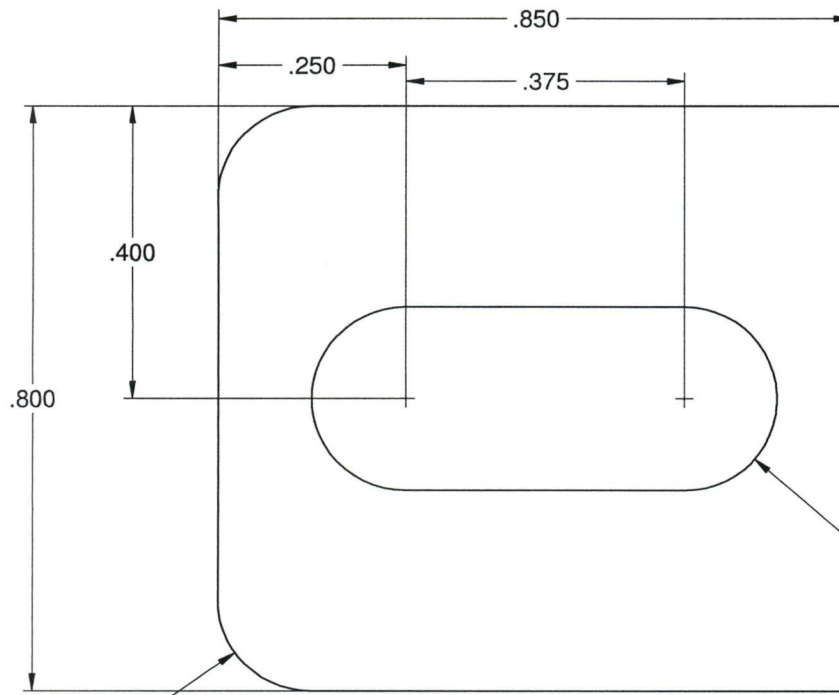
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Sheet gage 12

ECO#1
↑ 0.75" à 0.8" large
↑ épaisseur clip à 12 Ga.

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|---------------|
| 1/X ± 1/32" |
| X.XX ± 0.010" |
| X.XXX ± |
| ANGLE ± 1° |
| PROJECTION: |

| | | | | | |
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| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | | Échelle / Scale: N/A | |
| Approuvé par / Approved by: | | Date: (yyyy-mm-dd) | | Page #: 1 de 1 | |
| Numéro dessin / Drawing Number: VNR087 | | Rev.#: R04 | | Numéro de pièce / Part Number: 314-0006-15-B | |



Ø .250 $\begin{smallmatrix} +0.015 \\ -0.000 \end{smallmatrix}$

R 1/8 in
Typ.

1/16 in
(gege 16)

R 1/16 in
Round edge
Sanding

Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 16

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| TOLERANCES |
|-------------------|
| 1/X \pm 1/32" |
| X.XX \pm 0.010" |
| X.XXX \pm |
| ANGLE \pm 1° |
| PROJECTION: |



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| Bearpaw - Slotted clip support | | SEE NOTE | |
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| G. Lapointe | 2006-04-24 | A | 4 : 1 |
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| | | VNR089 | 1 de 1 |
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| | | 314-0007-15-B | R04 |

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INTRODUCTION

Scope

This installation instruction describes the step-by-step approach to install and to perform maintenance of the Helitowcart BearPaw for your Robinson R44.

General

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer sheet. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability will provide superior performance to your Robinson helicopter. Any question regarding the Helitowcart BearPaw system shall be directed to:

Table 1 – Helitowcart Customer Support

| Care of | Mailing Address | Phone, Fax & Email: |
|---|--|--|
| Customer Support Helitowcart BearPaw Helitowcart (Vanair inc) | 860 Marie-Victorin St-Nicholas, Levis, Quebec, Canada, G7A 3S9 | Tel:1 (418) 561-4512 Fax:1 (418) 836-2291 info@helitowcart.com |

Helicopter Effectivity

This installation instruction applies to the following ROBINSON Helicopters:

Table 2 – Robinson helicopter application

| A/C Model | Serial no. | Type Certificate Data Sheet |
|-----------|----------------------------|-----------------------------|
| R44 | 0271 thru 9999 | H11NM |
| R44 II | 1140, 10001 and subsequent | H11NM |

Installer Responsibilities

The installer shall ensure that the installation of the Helitowcart BearPaw does not conflict with any other part of the helicopter configuration. Technicians performing this installation should be familiar with A/C work and should have been familiarized with the different Helitowcart BearPaw system components prior to performing a first time installation. All steps in this procedure must be followed. Deviations from the procedures may result in potential structural failure or equipment malfunction and will result in a non-compliant installation.

INSTALLATION

BearPaw Installation

Reference Documentation:

- [1] Robinson R44 - Maintenance Manual & Instruction for Continued Airworthiness. RTR460.
- [2] Annex A – BearPaw Assembly Drawing (112-0001-00)

Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] to allow a clearance of the skid in the area of the aft cross tube of approximately 1 ½" (38mm);
- Remove aft skid wearshoe & Re-install screws.

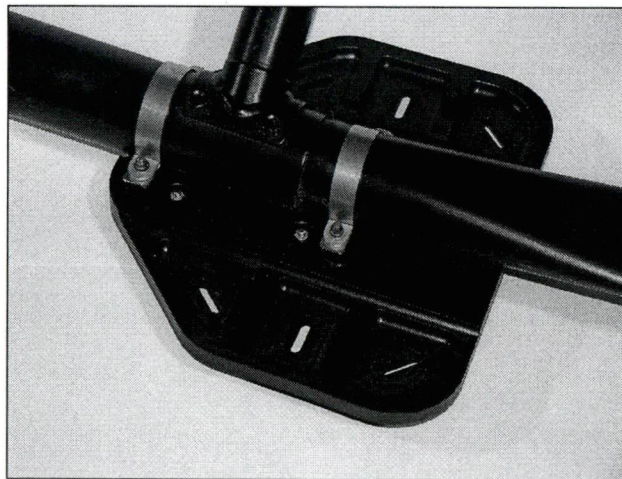
Step 2: BearPaw Preparation

- Install the ice blades (Qty:2) under the BearPaw pad as per drawing (112-0001-00) Ref [2];
- Insert washer (Washer P/N 263-0001-17) through threaded part of the ice blade and secure with nut (P/N 262-0001-17);
- Position the BearPaw under skid at the aft intersection with the cross tube as per figure 1 with narrow edge pointing forward.

Step 3: BearPaw Set Up

- Insert washers (P/N 263-0001-17) through all four bolts (P/N261-0001-17);
- Insert bolt(P/N261-0001-17) and washer (Washer P/N 263-0001-17) through BearPaw pad as per drawing (112-0001-00) Ref [2]
- Insert both U-shaped clips (P/N 314-0006-15) through bolts(P/N261-0001-17);
- Insert slotted clip supports (P/N 314-0007-15) through all four bolts. Position slotted clip supports with rounded edge toward helicopter skid;
- Insert washer (P/N 263-0001-17) & screw nuts (P/N 262-0001-17). Max. torque on nuts 60 in.-lb;
- Remove helicopter from lift;
- Amend Weight & Balance records as required

Figure 1 - Installed BearPaw



BearPaw Removal

Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] to allow a clearance of the skid in the area of the aft cross tube of approximately 1 ½" (38mm);

Step 2: BearPaw Removal

- Remove nuts (P/N 262-0001-17) on U-shaped clips (P/N 314-0006-15),
- Remove U-shaped clips (P/N 314-0006-15) and remove BearPaw pad (P/N 314-0001-01);
- Inspect skid tubes to confirm serviceability
- Re-install aft wearshoe with screws as per reference [1];
- Complete installation by putting helicopter back to normal position by removing lift status;
- Amend Weight & Balance records as required.

Weight & Balance

The following information should be used to amend the helicopter weight and balance information following the installation or removal:

Table 3 – Weight & Balance

| Item | Weight | Lateral | | Longitudinal | |
|-----------------------------------|--------|-------------------|------------------------|--------------|--------|
| | | Arm | Moment | Arm | Moment |
| Helitowcart BearPaw Model BP44 | ??? | 0.0in. (0.0mm) | 0.0lb-kg (0.0mm-kg) | ??? | ??? |

Parts Lists

The Helitowcart BearPaw detailed parts list is as follow:

Table 4 – Parts List

| Description | Qty | Part No. | Drawing no./name |
|-----------------------------------|-----|-------------|--|
| Helitowcart BearPaw Model BP44 | 1 | 112-0001-00 | 112-0001-00 / BearPaw Assembly |
| BearPaw pad | 1 | 314-0001-01 | 314-0001-01 / BearPaw - Pad |
| U Shaped Clips | 2 | 314-0006-15 | 314-0006-15 / BearPaw - U Shaped Clips |
| Slotted Clip Support | 4 | 314-0007-15 | 314-0007-15 / BearPaw - Slotted Clip Support |
| Bolts | 4 | 261-0001-17 | Bolt- AN4-14 |
| Nuts | 8 | 262-0001-17 | Nut- MS20-365-428 |
| Washers | 12 | 263-0001-17 | Washer – AN960-416 |

INSPECTION

Life Limited Items

Three are no life limited items for the Helitowcart BearPaw.

Pre-Flight

Before each flight the following items should be inspected:

- Check that attachment bolts are installed and secured,
- Check that BearPaws are free from visible damage,
- If damage is found, verify allowable damage according to:
 Table 5 – Tolerances for cracks & wear, &
 Annex B – BearPaw Allowable Damage Drawing (314-0001-01 page 2 of 2)

Periodic Inspection Schedule

- The Helitowcart BearPaw shall be inspected every 100 flying hours.
- The Helitowcart BearPaw can be inspected concurrently with the R44 landing gear inspection.
- Recommended tolerance for performance of inspection is +/- 10% of the 100 hours period.

100 Hour or Yearly Inspection Details

- Remove Helitowcart BearPaw: See Section "BearPaw Removal",
- Inspect all parts for damage & wear. See table & figure below for allowable damage,
- Replace all damaged parts,
- Replace parts worn beyond the tolerances indicated below.
- See Tolerances for cracks & wear:
 Table 5 – Tolerances for cracks & wear, &
 Annex B – BearPaw Allowable Damage Drawing (314-0001-01 page 2 of 2)

Table 5 – Tolerances for cracks & wear

| Zone | Nominal Dimension (Inches) | Allowable Damage/Wear (Inches) | Cracks |
|------|-------------------------------|-----------------------------------|---|
| A | 0,350 | 0,050 | |
| B | 1,000 | 0,250 | |
| C | 0,375 | 0,075 | <u>Stiffeners</u> : NO cracks in stiffeners. <u>Pockets</u> : Cracks are acceptable in the Helitowcart BearPaw pocket areas to a maximum length of 0,5" provided they are 0,25" away from the stiffener radius change. Stop drill cracks with a 0,125" hole. |
| D | 0,350 | 0,050 | |
| E | N/A | N/A | No cracks allowed in zone E |

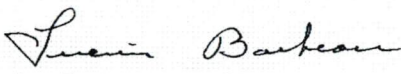
Overhaul Requirements

- Not applicable for the designated application of this device.

REVISIONS & APPROVAL**Revisions**

| Date | Rev | Nature |
|--------------|-----|---------------|
| June 1, 2006 | A | Initial issue |
| | | |

Approval

| | | |
|---------------------|--|----------------------------|
| Internal Approval : | | |
| Vanair Inc. |  Lucien Barbeau, president | <i>2006.05.23</i> Date: |
| External Approval : | | |
| Transport Canada | Mirko Zgela, DAR #310 | Date: |

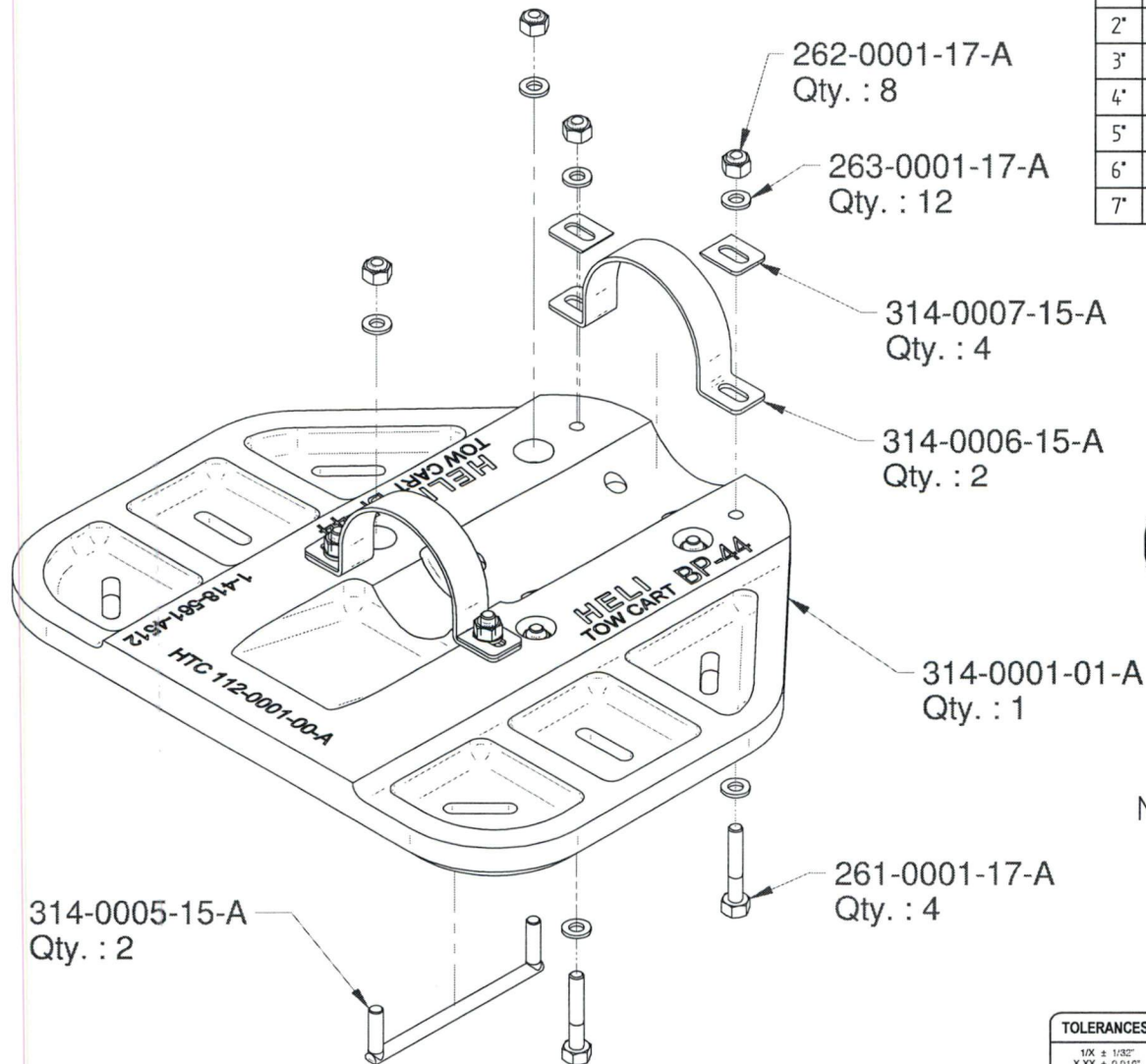
Annex A

See: BearPaw Assembly, drawing no. 112-0001-00.

Annex B

See: BearPaw Pad, drawing no. 314-0001-01. Page 2 of 2.

| N° | Qty | Description | Part # |
|----|-----|--------------------------------|---------------|
| 1° | 1 | Bearpaw - Pad | 314-0001-01-A |
| 2° | 2 | Bearpaw - Iceblade assembly | 314-0005-15-A |
| 3° | 2 | Bearpaw - U Shaped clip | 314-0006-15-A |
| 4° | 4 | Bearpaw - Slotted clip support | 314-0007-15-A |
| 5° | 8 | Nut MS20-365-428 | 262-0001-17-A |
| 6° | 12 | Washer AN960-416 | 263-0001-17-A |
| 7° | 4 | Bolt AN4-14A | 261-0001-17-A |



NOTE : Iceblade assembly can be omitted from installation (Optional)

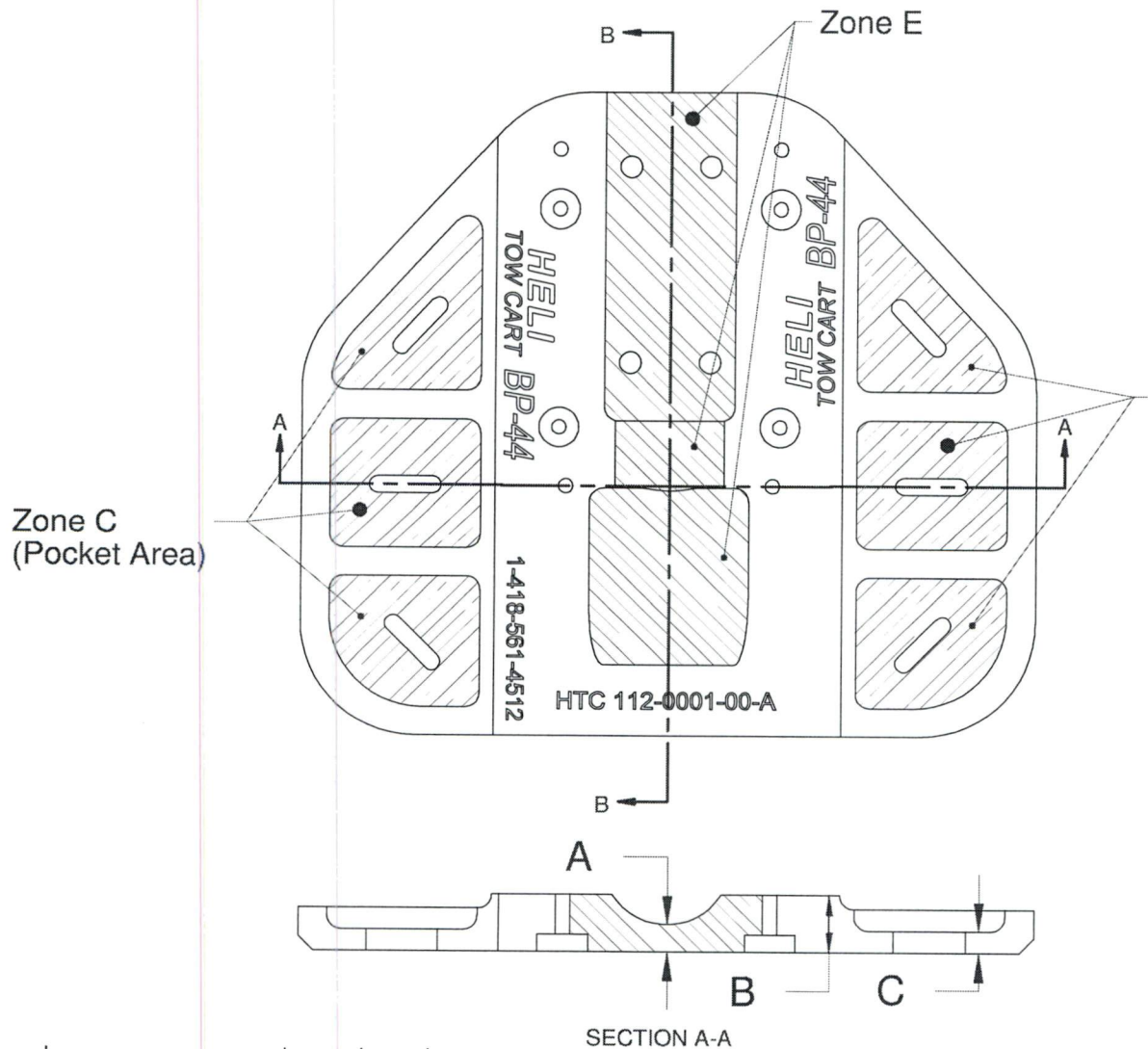
| | | | |
|------|----------------------|----------|------|
| R03 | Issue for production | 25-04-06 | G.L. |
| Rev. | Description | Date | By |

| | | | | | |
|-------------------|--|-----------------------------|--------------------|--------------------------------|-----------------|
| TOLERANCES | | Titre / Title | | Material / Material | |
| 1/X ± 1/32" | | Bearpaw Assembly | | | |
| X/XX ± 0.010" | | Dessiné par / Drawing by: | Date: (yyyy-mm-dd) | Format | Echelle / Scale |
| X/XXX ± 0.005" | | G. Lapointe | 2006-04-25 | B | N/A |
| ANGLE ± 1° | | Vérifié par / Checked by: | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number | Page # |
| | | | | VNR083 | 1 de 1 |
| PROJECTION | | Approuvé par / Approved by: | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number | Rev # |
| | | | | 112-0001-00-A | R03 |

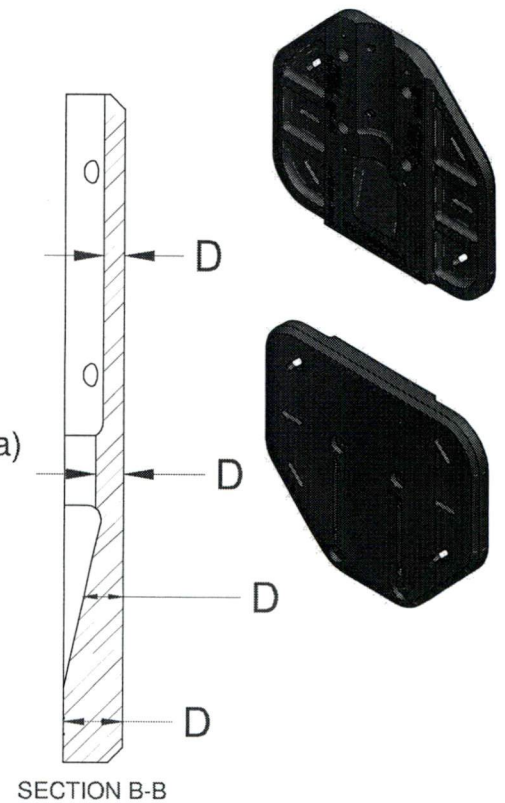
HELI
TOW CART

Vanair Inc.
890, Marie-Victorin
St-Nicolas, Lévis (Québec)
Canada, G7A 3S9
Tel.: (418) 561-4512
Fax: (418) 856-2291
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Zone C
(Pocket Area)



SECTION A-A

| Rev. | Description | Date | By |
|------|----------------------|----------|------|
| R03 | Issue for production | 04-04-06 | G.L. |
| R02 | Révision Générale | 23-03-06 | G.L. |
| R01 | Initial issue | 27-02-06 | G.L. |

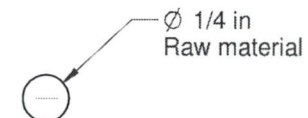
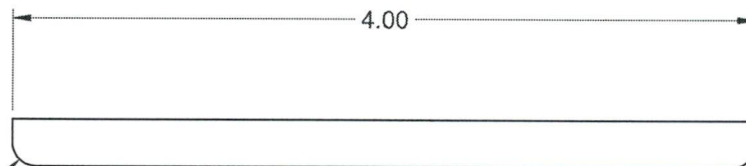
| TOLERANCES |
|-------------------|
| 1/X \pm 1/32" |
| X.XX \pm 0.010" |
| X.XXX \pm |
| ANGLE \pm 1° |

| Title / Titre | | Material / Matériau | | See Note | |
|----------------------------|-------------|---------------------|------------|--------------------------------|---------------|
| Bearpaw - Pad | | | | 2 de 2 | |
| Drawn by / Dessiné par | G. Lapointe | Date / Date | 2006-04-24 | Format | B |
| Checked by / Vérifié par | | Date / Date | | Numéro dessin / Drawing Number | VNR088 |
| Approved by / Approuvé par | | Date / Date | | Numéro de pièce / Part Number | 314-0001-01-A |
| | | | | Row # | R03 |

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Round corners
after asssembly
Typ.

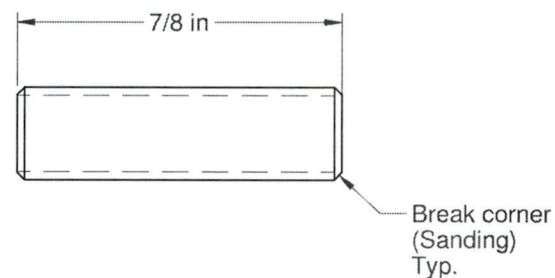
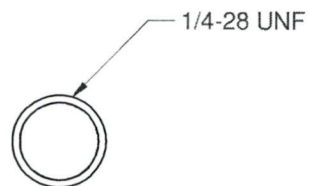


Note :
Raw material specification :
Stainless steel 304 annealed
Rod

| | | | |
|------|---------------|----------|------|
| R1 | Initial issue | 03-08-06 | G.L. |
| Rev. | Description | Date | By |

| TOLERANCES |
|--------------------|
| 1/X \pm 1/32" |
| X.XX \pm 0.010" |
| X.XXX \pm 0.005" |
| ANGLE \pm 1° |
| PROJECTION: |

| | | | | | |
|---|--|---|--|---|--------------------------|
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| | | Titre / Title: Bearpaw - Iceblade | | | |
| Dessiné par / Drawing by: G. Lapointe | | Date: (yyyy-mm-dd) 2006-04-24 | Format : A | Échelle / Scale: 1 : 1 | Page #: 1 de 1 |
| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: VNR084 | | Rev. #: R1 |
| Approuvé par / Approved by: | | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number: 314-0002-15-A | | Rev. #: |

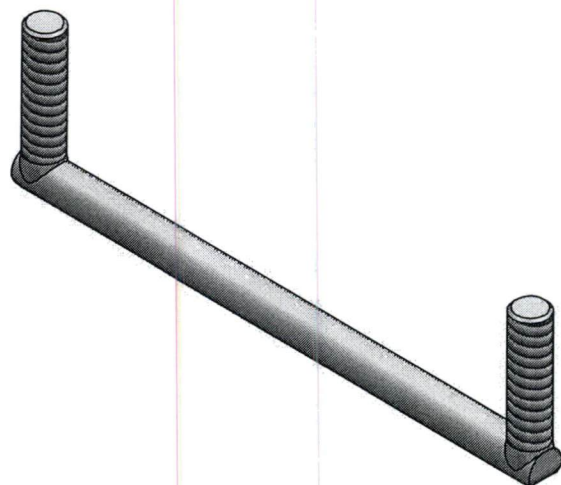


Note :
Raw material specification :
Stainless steel 304 annealed
Threaded rod 1/4-28 UNF

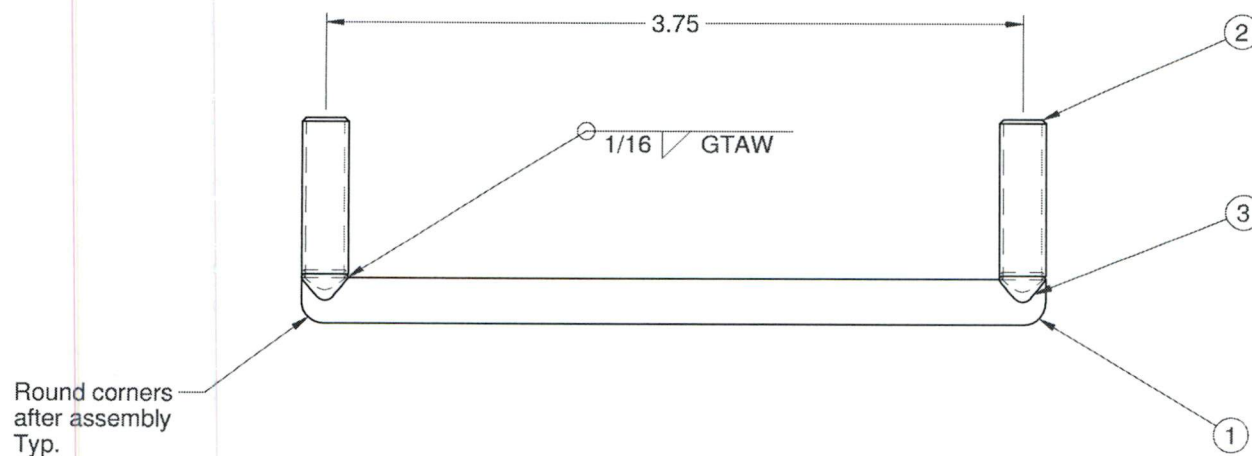
| R1 | Initial issue | 03-08-06 | G.L. |
|------|---------------|----------|------|
| Rev. | Description | Date | By |

| TOLERANCES |
|--------------------|
| 1/X \pm 1/32" |
| X.XX \pm 0.010" |
| X.XXX \pm 0.005" |
| ANGLE \pm 1° |
| PROJECTION: |

| | | | | | |
|---|--|---|--|---|--------------------------|
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| | | Titre / Title: Bearpaw - Iceblade threaded rod | | | |
| Dessiné par / Drawing by: G. Lapointe | | Date: (yyyy-mm-dd) 2006-04-24 | Format : A | Échelle / Scale: N/A | Page #: 1 de 1 |
| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: VNR085 | | Rev. #: R1 |
| Approuvé par / Approved by: | | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number: 314-0004-15-A | | Rev. #: |




| N° | Qty: | Description | Doc # |
|----|------|--|---------------|
| 1* | 1 | Bearpaw - Iceblade | 314-0002-15-A |
| 2* | 2 | Bearpaw - Iceblade threaded rod | 314-0004-15-A |
| 3* | 2 | Filler Material AWS A-5.9 / ASME SFA-5.9 | MGSS308L |

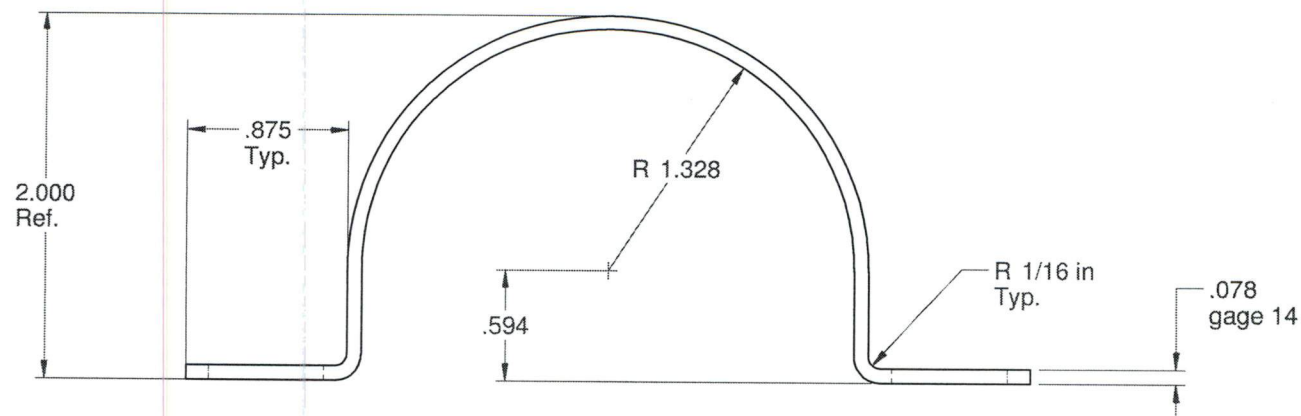
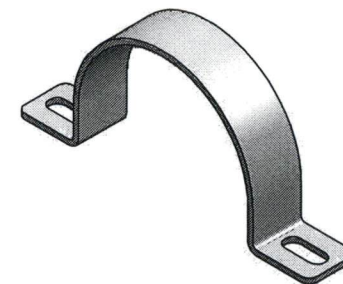
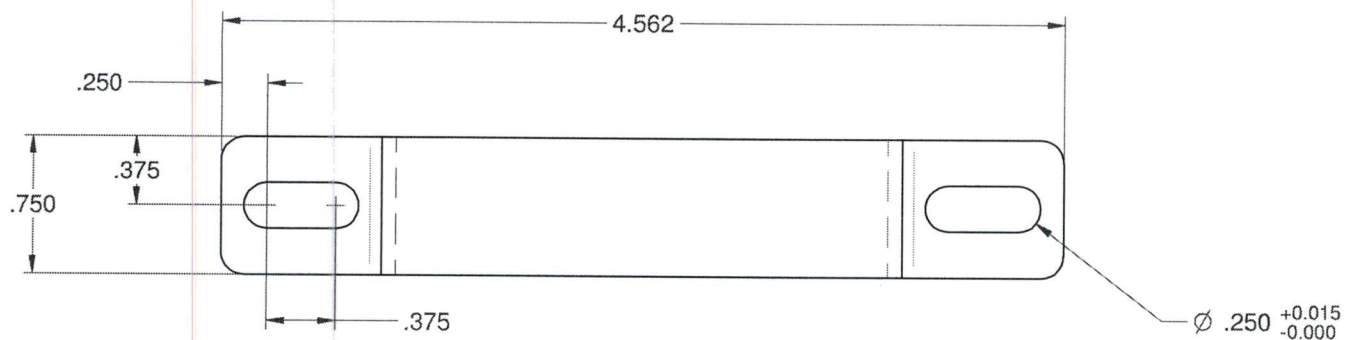


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| R1 | Initial issue | 03-08-06 | G.L. |
|------|---------------|----------|------|
| Rev. | Description | Date | By |

| TOLERANCES | | Titre / Title | | Matériel / Material: | |
|---|--|----------------------------------|---|-------------------------|-------------------|
| 1/X ± 1/32" X.XX ± 0.010" X.XXX ± 0.005" ANGLE ± 1° | | Bearpaw - Iceblade assembly | | | |
| Dessiné par / Drawing by: G. Lapointe | | Date: (yyyy-mm-dd) 2006-04-24 | Format : A | Échelle / Scale: N/A | Page #: 1 de 1 |
| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | Numéro dessin / Drawing Number: VNR086 | | Rev.#: R1 |
| Approuvé par / Approved by: | | Date: (yyyy-mm-dd) | Numéro de pièce / Part Number: 314-0005-15-A | | Rev.#: |
| PROJECTION:  | | | | | |



Note :
 Raw material specification :
 Stainless steel 304 annealed
 Sheet gage 14

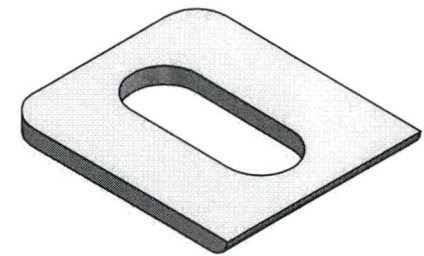
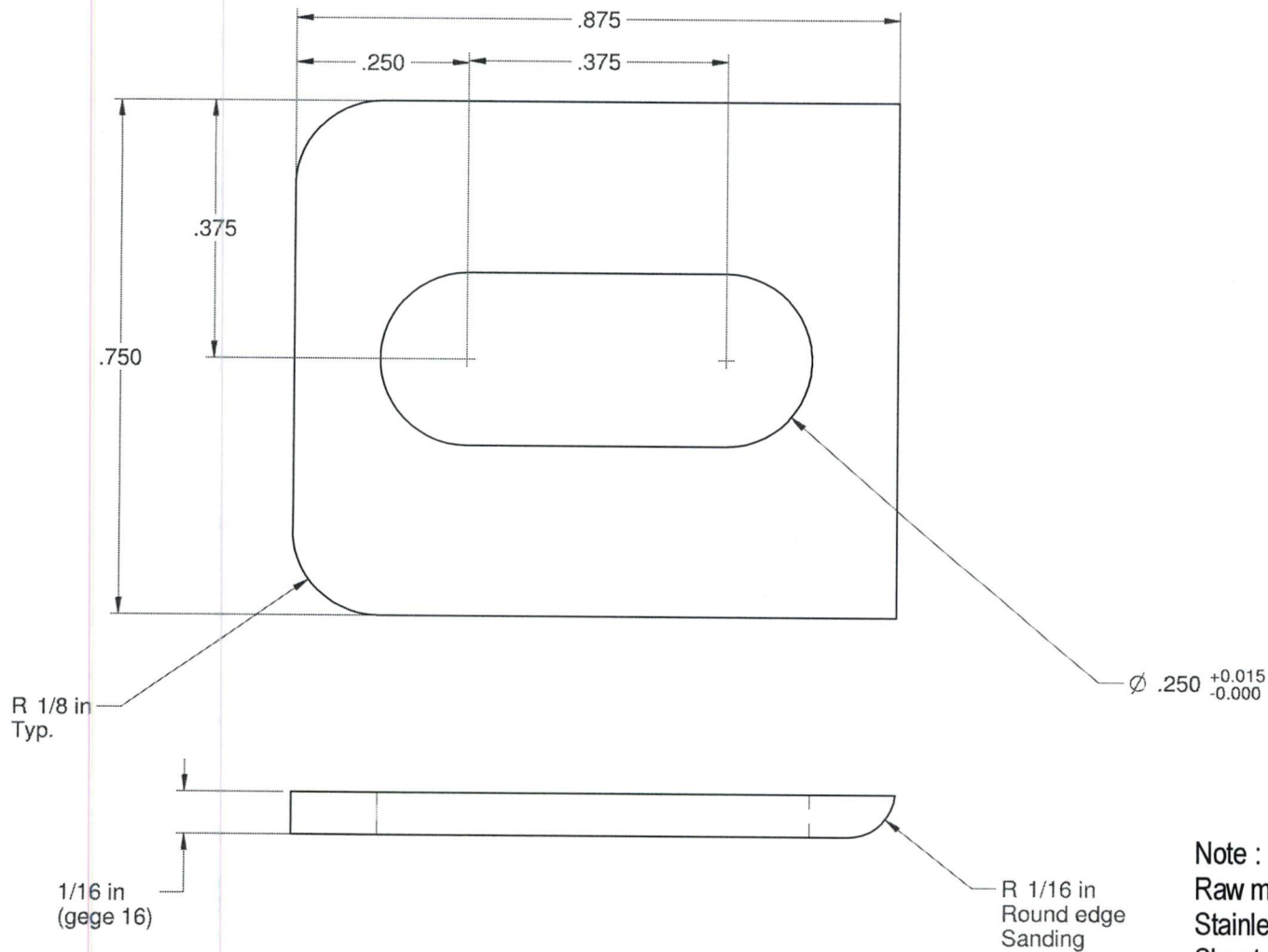


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|------|----------------------|----------|------|
| R03 | Issue for production | 04-04-06 | G.L. |
| Rev. | Description | Date | By |

| TOLERANCES | | Titre / Title | | Matériel / Material: | |
|-------------------|--|-----------------------------|--------------------|---------------------------------|------------------|
| 1/X \pm 1/32" | | Bearpaw - U Shaped clip | | See Note | |
| X.XX \pm 0.010" | | Dessiné par / Drawing by: | Date: (yyyy-mm-dd) | Format : | Échelle / Scale: |
| X.XXX \pm | | G. Lapointe | 2006-04-24 | A | N/A |
| ANGLE \pm 1° | | Vérifié par / Checked by: | Date: (yyyy-mm-dd) | Número dessin / Drawing Number: | Page #: |
| PROJECTION: | | | | VNR087 | 1 de 1 |
| | | Approuvé par / Approved by: | Date: (yyyy-mm-dd) | Número de pièce / Part Number: | Rev. #: |
| | | | | 314-0006-15-A | R03 |



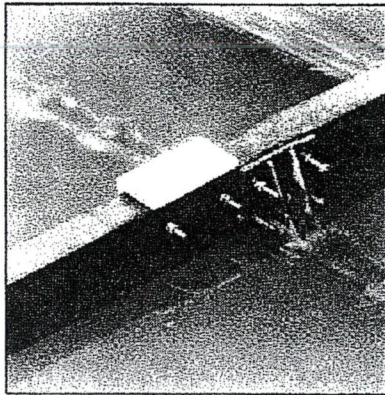
Note :
Raw material specification :
Stainless steel 304 annealed
Sheet gage 16

| R03 | Issue for production | 04-04-06 | G.L. |
|------|----------------------|----------|------|
| Rev. | Description | Date | By |

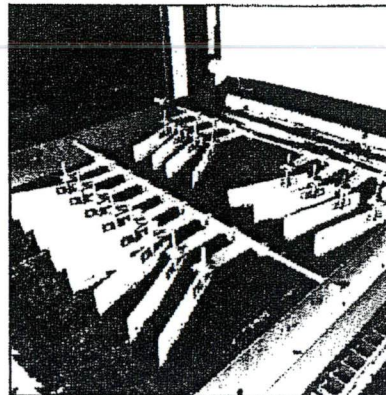
| TOLERANCES |
|--|
| 1/X $\pm 1/32"$ X.XX $\pm 0.010"$ X.XXX \pm ANGLE $\pm 1^\circ$ |
| PROJECTION: |

| | | | | | |
|-----------------------------|-------------|---|------------|---|---------------|
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| | | Bearpaw - Slotted clip support | | SEE NOTE | |
| Dessiné par / Drawing by: | G. Lapointe | Date: (yyyy-mm-dd) | 2006-04-24 | Format : | A |
| Vérifié par / Checked by: | | Date: (yyyy-mm-dd) | | Échelle / Scale: | 4 : 1 |
| Approuvé par / Approved by: | | Date: (yyyy-mm-dd) | | Número dessin / Drawing Number: | VNR089 |
| | | | | Número de pièce / Part Number: | 314-0007-15-A |
| | | | | Page #: | 1 de 1 |
| | | | | Rev.#: | R03 |

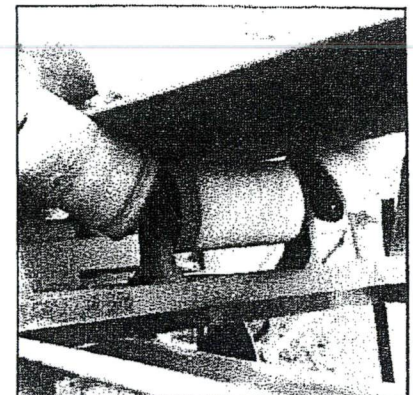
Propriétés du UHMW TIVAR®



TIVAR flight wear shoes do not corrode, and outwear shoes made from metals, urethanes and other plastics.



TIVAR is used in many OEM applications to solve abrasion and corrosion problems. The scrapers on this belt press are of TIVAR.



Conveyor rollers lined with TIVAR reduce belt wear. Wet sludge doesn't build up as on conventional rollers.

| PHYSICAL PROPERTIES | | | |
|--|-------------------------|-------------------|---------------|
| PROPERTY | TEST METHOD | UNIT | TYPICAL VALUE |
| Specific Gravity | ASTM D-792 | g/cm ³ | 0.94 |
| Yield Strength @73°F | ASTM D-638 | p.s.i. | 3400 |
| Ultimate Tensile Strength @73°F | ASTM D-638 | p.s.i. | 6800 |
| Break Elongation @73°F | ASTM D-638 | % | 450 |
| Yield Strength @250°F | Stress Strain Diagram | p.s.i. | 700 |
| Ultimate Tensile Strength @250°F | Stress Strain Diagram | p.s.i. | 3300 |
| Break Elongation @250°F | Stress Strain Diagram | % | 900 |
| Hardness —Rockwell "R" Scale | ASTM D-785 | — | 64 |
| Shore "D" Scale | ASTM D-2240 | — | 67 |
| Flexural Modulus of elasticity | Bend Creep/1 min. value | p.s.i. | 110,000 |
| Shear Strength | ASTM D-732 | p.s.i. | 3500 |
| Izod Impact + @23°C | ASTM D-256A | ft-lbs/in. notch | No Break |
| - @140°C | ASTM D-256A | ft-lbs/in. notch | No Break |
| Environmental Stress Cracking @F ₅₀ | ASTM D-1693 Mod | hrs. | 6000 |
| Water Absorption | ASTM D-570 | — | NIL |

COEFFICIENT OF FRICTION

UHMW Polymer has a lower coefficient of friction than glass. Together with its self-lubricating characteristics it is an ideal material for bearings, bushings, valves, wear strips or any application where sliding contact is encountered.

| MATERIALS | STATIC | KINETIC | TEST METHOD |
|---------------------------|-----------|-----------|-------------|
| Mild Steel vs. Mild Steel | 0.30-0.40 | 0.25-0.35 | ASTM D-1894 |
| Mild Steel vs. TIVAR-100 | 0.15-0.20 | 0.12-0.20 | |
| TIVAR-100 vs. TIVAR-100 | 0.20-0.30 | 0.20-0.30 | |

| DEFORMATION UNDER COMPRESSION - % | | | | | | | PERMANENT DEFORMATION AFTER REMOVAL OF LOAD | |
|-----------------------------------|-----------------|-----------------|----------|-----------|-------|---------|---|---------------|
| TEMP °F | PSI COMPRESSION | INITIAL LOADING | | | | | AFTER 1 MIN. | AFTER 24 HRS. |
| | | 10 MIN. | 100 MIN. | 1000 MIN. | 1 DAY | 56 DAYS | | |
| 68° | 262 | 1.5 | 1.7 | 1.8 | 1.9 | 2.4 | 0.9 | 0.8 |
| | 570 | 2.4 | 2.5 | 2.7 | 3.0 | 4.0 | 1.8 | 1.2 |
| | 850 | 3.0 | 4.0 | 4.5 | 5.0 | 5.1 | 2.7 | 1.8 |
| | 1140 | 4.0 | 5.0 | 6.0 | 7.0 | 7.5 | 3.8 | 2.4 |
| | 1420 | 5.0 | 6.5 | 7.5 | 8.0 | 9.0 | 4.5 | 2.9 |
| | 1700 | 7.0 | 7.5 | 8.0 | 10.0 | 11.0 | 5.4 | 3.5 |

CHEMICAL RESISTANCE

Hydrochloric acid (conc.) - no appreciable reaction up to 80°C

Nitric acid (20%) - less than 20% decrease in yield stress and ultimate tensile strength up to 80°C.

Sulphuric acid (50%) - no appreciable reaction up to 80°C. Less than 20% decrease in properties at 75% concentration.

Sodium hydroxide (caustic soda) - no appreciable reaction up to 80°C.

Sodium hypochlorite and most aqueous solutions of inorganic salts - no appreciable reaction up to 80°C.

Hydrocarbons and halogenated hydrocarbons -limited resistance. Each application should be evaluated.

www.plastiquepolyfab.com

QUÉBEC : 1275, de la Jonquière, Québec, QC, Tél. : 418-682-0760 ou 1-866-682-0760

MONTREAL : 7600, Rte Transcanadienne, St-Laurent, QC, H4T 1A5 Tél. : 514-738-6817 ou 1-888-506-9600

Ultra High Molecular Weight Polyethylene

UHMWPE Typical Properties

| | | |
|--|-------------------|-----------------------------|
| Specific Gravity, 73°F | .944 | |
| Tensile Strength @ Yield, 73°F | 3250 | psi |
| Tensile Modulus of Elasticity, 73°F | 155,900 | psi |
| Tensile Elongation (at break), 73°F | 330 | % |
| Flexural Modulus of Elasticity | 107,900 | psi |
| Compressive Strength at 2% deformation | 400 | psi |
| Compressive Strength 10% Deformation | 1200 | psi |
| Deformation Under Load | 6-8 | % |
| Compressive Modulus of Elasticity, 73°F | 69,650 | psi |
| Hardness, Durometer (Shore "D" scale) | 69 | |
| Izod Impact, Notched @ 73°F | 30 | ft.lbs./in. of notch |
| Coefficient of Friction (Dry vs Steel) Static | .17 | |
| Coefficient of Friction (Dry vs Steel) Dynamic | .14 | |
| Sand Wheel Wear/Abrasion Test | 95 | UHMW=100 |
| Coefficient of Linear Thermal Expansion | 11.0 | in/in/°F x 10 ⁻⁵ |
| Melting Point (Crystalline Peak) | 279-289 | °F |
| Volume Resistivity | >10 ¹⁵ | ohm-cm |
| Surface Resistivity | >10 ¹⁵ | ohm-cm |
| Water Absorption, Immersion 24 Hours | Nil | % |
| Water Absorption, Immersion Saturation | Nil | % |
| Machinability Rating | 5 | 1 = easy. 10 = difficult |
| Sheet Thickness Availability (Off the Shelf) | .250 - 2.0 | inches |

